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GEOGRAPHIC SCHOOL BULLETINS

Published Weekly by

THE NATIONAL GEOGRAPHIC SOCIETY

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Hermann von Walde-Waldegg

COLOMBIA'S "MISSING LINK" INDIANS LIKED THEIR GODDESSES GRIM

A now-vanished Indian race lived between 250 B. C. and 1,000 A. D. in southwest Colombia, in the upper Magdalena valley. Little is known of them except that they studied astronomy, had a lunar calendar, built stone water conduits, raised corn, and spun wool for clothing. Hundreds of their carvings have been found. To help the gods command awe, Indian sculptors gave them long gnashing teeth and frightening faces. Some have square eyes. This typical scareface goddess holds a big-eared godlet whose crescent headdress probably shows that he represents the new moon. The vanished culture is a missing link in the nation's history, preceding the Chibcha Indians, who had an advanced civilization long before Columbus skirted the shores of the country that now bears his name (Bulletin No. 2).

HOW TEACHERS MAY OBTAIN THE BULLETINS

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General Headquarters, Washington, D. C.

Iraq, Arabian Nights Land, a Moslem Ally for United Nations

IRAQ's recent declaration of war against the Axis has aligned beside the United Nations an ally which is the world's eighth-largest oil-producing nation and the homeland of a large Moslem population.

This is the first full-fledged Moslem member of the United Nations. Moslem allies are especially welcome now that the war has reached the French and Italian colonies of North Africa, all of them predominantly Moslem.

Biblical Land of the Little King

Iraq, where Biblical scholars identify the date palm gardens between the Tigris and the Euphrates Rivers as the Garden of Eden, has been a stronghold of the followers of Mohammed for 1,300 years. Some two-thirds of the people are of Arab blood, and follow the faith born in Arabia in the 6th century A. D. Early Moslem caliphs made their headquarters at the ancient city of Baghdad, now modern Iraq's capital (illustration, next page).

Since the earliest records, the Iraq region has been known as Mesopotamia, the "Land between the Rivers," built of silt washed down from barren northern mountains by the Tigris and Euphrates. Within what is now Iraq's territory rose and fell the early Babylonian empire that Hammurabi built, the Assyrian empire centering at Nineveh, the kingdom of Nebuchadnezzar.

But plundering armies from Asia ravaged the land in the 13th century, destroying the system of irrigation canals that nourished agriculture. Thereafter, until the rule of Ottoman Turks was broken in World War I, Mesopotamia was a tired and hungry land of slow-moving, date-laden camel caravans and undernourished desert nomads. The pace of life in the new independent kingdom of Iraq amazes travelers who knew the land a generation ago.

Mandated to Britain after the World War, Iraq became independent in 1932. A regency now governs the nation's three and a half million people for eight-year-old King Feisal II, made king in 1939 after the accidental death of his father.

Double Pipe Line Was a National Tonic

Roughly triangular in shape, Iraq adds a rugged area (116,600 square miles) larger than New England and New York combined to the lands united against the Axis.

The renovating of this ancient land has accompanied the development of its rich oil resources. Rough, tough oil-field workers from Texas and Oklahoma laid the Y-shaped double pipe line system that is the trademark of Iraq today. From Kirkuk, in the heart of the oil country of the northeast, the pipes carry oil to the Mediterranean—a petroleum life line for the British fleet.

Three years of work, some 15,000 laborers, and close to $50,000,000 were necessary to complete the pipe line job. The first oil flowed through in 1935.

Roughly half of the tubing, which touches four countries on its way to the sea, is laid in Iraq. For the first section, two pipe lines run a parallel course to the desert village of Haditha, where they part company. The northern arm reaches westward across the Levant States to Tripoli. The southern branch forks southwestward across Trans-Jordan and Palestine to the port of Haifa. Together, the two pipe lines in the system cover more than 1,160 miles.

In digging ditches for the pipes, workmen used pneumatic drills, tractors, and

COLOMBIA CAPS SOUTH AMERICA'S STRAWBERRY SHAPE

If South America were a strawberry, Colombia would be the cap and Panama the stem. On the Caribbean section of its two-ocean coast line (once renowned as part of the "Spanish Main") stand Santa Marta and Cartagena, old treasure ports where corsairs and conquistadores made history. Now the nation's sixth-largest city, Cartagena is surpassed by Barranquilla, which ranks third. The others of the seven chief cities are inland—Bogotá, Medellín, Cali, Manizales, and Ibagué (Bulletin No. 2).

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Variety Marks Two-Ocean Colombia

(This is the ninth of a series of bulletins, with maps and illustrations, on the republics of Latin America.)

NEAREST South American country to the United States, Colombia is the only nation on the continent except Chile to have the geographic advantage of a two-ocean coastline (map, inside cover.)

Colombia is only about 130 airline miles from the Western Hemisphere's most strategic waterway, the Panama Canal.

The Colombian Republic indicated its friendship with the United States by breaking off relations with Japan the day after the Pearl Harbor attack, and with Germany and Italy eleven days later.

Alice-in-Wonderland Scene Shifts

Within roughly 440,000 square miles of territory, Colombia has a population of between nine and ten million people.

The country has astonishing variety, even for highly diversified South America. There are arid reaches and rain-drenched tropics; Andes peaks above 18,000 feet and flat tablelands; populous cultivated areas and remote jungles alive with monkeys, pumas, deer, alligators, deadly snakes, and bright, noisy birds.

Climbing by river and rail from torrid Caribbean ports, such as Cartagena or Barranquilla, to the mountain capital, Bogotá, is an Alice-in-Wonderland experience of quick-changing scenery. At the lower levels you pass plantations of bananas, cacao, sugar cane, cotton, and rice. You rise gradually into landscapes marked by coffee farms, fruit orchards, corn and wheat fields; by green pastures where sleek cows graze. Still higher you find small farms where Indians make a scant living by raising hardy crops of potatoes and beans, barley and other grains.

Under the direct sun rays of the Torrid Zone, encouraged by ample and sometimes surplus rainfall, the fertile Colombian soil yields a wide range of the world's commodities.

In the valleys of the Magdalena and Cauca Rivers (important arteries of trade and travel) grow rich crops of coffee, sugar, cotton, and tobacco.

Colombian forests contain uncatalogued resources in mahogany, balsa wood, oak, dyewoods; in cinchona bark, for quinine; in tagua palms whose nuts provide vegetable ivory for buttons; and rubber trees, now being developed to help meet war demands.

A World Pioneer in Air Transportation

Coffee is Colombia's leading export crop, and the most important commodity in the nation's business. This country ranks second only to Brazil in coffee growing. Other important exports are gold, petroleum, bananas, hides, and platinum.

Legend says that prehistoric Colombian Indians, finding the white metal of platinum in the river beds, used to throw it back to "ripen" into gold. There are historic emerald mines in Colombia, and copper, lead, mercury, and manganese. The spectacular salt mines, carved into fantastic shapes, have been worked for centuries.

The mountains make the climate, which varies according to altitude rather than latitude. They dictate the kinds and often the amounts of farm crops. Be-

explosives. Fleets of trucks drove back and forth over the sun-baked rocky trails of the desert, hauling men and supplies. More than 5,500 miles of brown paper, 18 inches wide, were used as protective wrapping for the pipes—making the biggest wrapping-paper job in history. Then pumping stations were set up to keep the oil moving and to regulate its flow through the pipes.

Agriculturally, Iraq's future depends on irrigation projects. The fertile Garden of Eden spreads between the Tigris and Euphrates Rivers northwest from Baghdad. Canals from a new Euphrates dam now irrigate the land of Adam and Eve. The palm gardens around Basra, port city on the Shatt-al-Arab near the Persian Gulf, normally supply the world with five-sixths of all its dates.

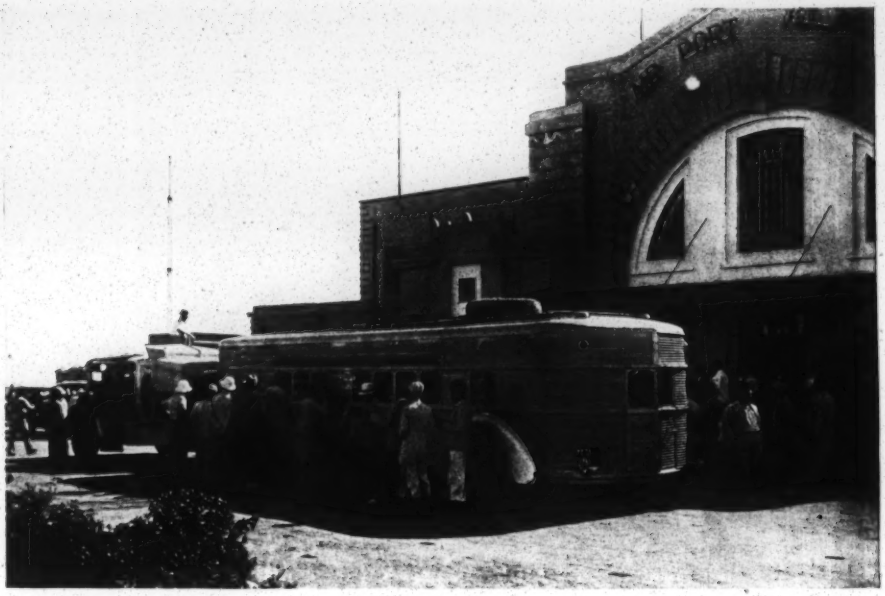
In Baghdad, wide new streets, motor cars, radios, and modern entertainment palaces contrast with ancient mosques and minarets.

At Basra, port of Sindbad the Sailor, Arab sailboats mingle with great tanker fleets. A handsome airport hotel formerly provided for travelers on English, Netherlands, and French air lines from London and Paris to Singapore and Sydney.

Note: Iraq appears on the National Geographic Society's Map of Europe and the Near East. A map price list may be obtained from the Society's headquarters in Washington, D. C.

For further material, see these articles in the *National Geographic Magazine:* "Bombs Over Bible Lands," August, 1941*; "Change Comes to Bible Lands," December, 1938*; "New Light on Ancient Ur," January, 1930*; and "Archeology, the Mirror of the Ages," August, 1930*; and the following GEOGRAPHIC SCHOOL BULLETINS: "Fate of Mandates After 20 Years," December 8, 1941; and "Iraq Presents Problem in Billion Dollar Diplomacy," May 5, 1941. *(Issues marked by an asterisk are included in the special list of Magazines available to teachers at 10¢ each in groups of ten.)*

Bulletin No. 1, February 8, 1943.



W. Robert Moore

PLANES AND AIR-CONDITIONED BUSES ARE CHILDREN OF THE MAGIC CARPET

Modern Baghdad, ancient capital of Arabian Nights fame, sees strange and miraculous happenings every day that would take a thousand and two nights to tell. Instead of a flimsy flying carpet, airplanes float over the city and regularly bring more than a carpetful of passengers to the airport terminal, labeled in English as well as Iraqi (above). For comfort on journeys through desert temperatures of 111 degrees, the spacious air-conditioned buses of stainless steel carry their own climate, a constant 76 degrees. Furthermore, Iraq has a rail link with the systems of Europe, so that a mere engine instead of *jinn* can whisk peacetime travelers from Baghdad to Berlin, Paris, Madrid, and the Atlantic.

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Ports of Northwest Italy Cringe Beneath Bombs

Savona Draws Bombs to Italy's Riviera

SAVONA, recently bombed, strikes a jarring industrial note in Italy's once-gay Riviera playground. Its smokestacks belch soot on near-white villas in flower gardens among orange groves.

The port is near the west end of the crescent of coast that arches around the broad Gulf of Genoa, at the top of Italy's "boot." It is 26 miles southwest of Genoa, the more successful rival port at the head of the gulf, and roughly opposite La Spezia, about 50 miles farther along on the gulf's east shore.

Savona's wartime factories produce steel rails, electric locomotives, sulphur for industrial chemicals, and tinplate. Shipyards turn out vessels to carry provisions for a foreign war. A refinery processes imported petroleum, filling the many storage tanks that bulk large in the landscape. There are also bottle factories, potteries, brickyards, and tanneries. Savona's more peaceful specialty, majolica ware, has been noted for centuries.

Cheap electric power supplied from Alpine streams to the north is an asset to the city. A railway from Turin in the north crosses the mountains and there joins the coastal rail line. The port's good harbor normally handles more than a million tons of shipping a year.

The crooked, crowded old town hugging the harbor is surrounded by a spacious crescent of modern buildings and straight streets. A Roman settlement anciently known as Savo once occupied the site.

The city has marked a house in which Savona asserts Columbus was born. But so have other places, including Genoa, whose claim appears stronger.

Genoa Is Sea Gateway for War Plants of North Italy

Genoa, bombed by the British, is one of Italy's leading ports. Northernmost port on Italy's west coast, its location near the large munitions plants of Turin and Milan makes it an important outlet for supplies for the African front.

About a fifth of Italy's shipping passes through Genoa, which in normal times imports nearly eight times as much as it exports. Its ancient harbor, where Greeks settled four centuries B. C., has been modernized with drydocks, shipyards, and great warehouses. There are eight miles of quays. Four rail lines, for whose engines Alpine streams furnish electric power, transport vast cargoes to and from the ships.

In peacetime, Genoa was the hub of Italy's air lines which radiated to western and central Europe, to Greece, North Africa, Egypt, and the East.

Medieval Genoa (Genova in Italian) built a commercial empire whose influence reached into North Africa and the Levant, until overshadowed by Venice.

With the growth of trade, rivalling Marseille's, Genoa's population increased to more than 650,000. New buildings climbed farther and farther up the foothills of the Ligurian Alps overlooking the great shipping arena.

Columbus, who spent his boyhood in Genoa, not only inspired the city to maritime greatness, but blazed the trail for the millions of Italians who were later to sail to America (illustration, next page).

Genoa is also important in Italy's history as the scene of the gathering, in 1860, of the "Redshirts," the patriots who, under Garibaldi, played a major part in unifying Italy.

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cause of mountain obstacles to continuous railroads and highways, Colombia has taken to the air for travel. This republic, in fact, was one of the world's pioneers in establishing regular plane service in 1919.

Most of the Colombians, of whom roughly half are of mixed Indian and Spanish blood, live in valleys and on plateaus of the mountainous west. The Negro population (the result of importing first slave, then free, labor) is spread along the coast.

Bogotá Has Many Resemblances to Spain

The Spanish element predominates in the cities. Bogotá particularly, with its 17th century university, its narrow cobblestone streets, clanging church bells, patios, and balconies, in its older sections is like some Spanish town transplanted to South America.

Colombia was one of Spain's first colonies in the Americas, and although it was also among the first to break with the mother country, colonial Spanish architecture and formal ways of life persist—along with new methods and objectives of a progressive nation.

Note: Colombia is shown on the National Geographic Society's Map of South America, issued as a supplement to the October, 1942, *National Geographic Magazine*.

For further information on Colombia, see these articles in the *National Geographic Magazine*: "Hail Colombia!" October, 1940*; "Stone Idols of the Andes Reveal A Vanished People," May, 1940*; and "Round About Bogotá," February, 1926; and these GEOGRAPHIC SCHOOL BULLETINS: "Colombia-Venezuela Border Dispute Settled," May 19, 1941 (Geo-Graphic Brevity)*; "Emerald: A Green Light for 'Go Rich'," April 24, 1939.

Bulletin No. 2, February 8, 1943.

Luis Marden

TONGUE TRAFFIC CAUSES A JAM ON BOGOTA'S MAIN STREET

Colombia's seat of government, like Ecuador's and Bolivia's capitals, is up near the clouds at an altitude of 8,660 feet. An old Spanish custom preserved there is the *charla*, the "chat," which rates as a principal outdoor sport in the 400-year-old city. There men are the talkative sex. Clusters of business men exchanging ideas on politics and news (such as the events reported in *El Siglo*, "The Century," for sale in the foreground) clog Seventh Avenue, the main street, every day around five o'clock, and no vehicles are permitted to push through the crowds except streetcars. This is the largest Colombian city, with a third of a million people.

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Steel Shortage! And Sponge Iron to the Rescue

SHADES of brawny prehistoric metal-makers watch with amazement—and recognition—the latest goings-on in the United States industrial world. The biggest, most up-to-date steel industry on earth, starving for raw materials to make into ships, tanks, trucks, and guns, is enlisting the aid of the earliest product of man's first tinkering with iron—sponge iron.

This is an old form of nearly pure iron, extracted from the ore at fairly low temperatures in spongy lumps or granules full of air bubbles. When pounded into toughness, it becomes the familiar product known as wrought ("worked") iron.

To understand why streamlined modern industry gropes backward into history to recover this ancestral product, one must recall that steel comes from iron ore by several steps, somewhat as a loaf of bread comes from grains of wheat.

Subtract Oxygen, Add Carbon, Get Steel

Iron ore is largely iron plus oxygen. Steel is basically iron plus carbon. Steel making is a matter of chasing the oxygen out of the ore and pushing in the right amount of carbon—not too much, not too little.

Modern industry has been accomplishing this by melting iron ore with limestone and coke in 100-foot-tall blast furnaces at high temperatures, then draining off this molten metal and allowing it to cool into "pigs," or ingots. The pig iron has picked up from the coke more carbon than is good for steel—up to 3½ per cent. So it is dumped into another furnace—usually an open-hearth furnace—which, by baking out the excess carbon, produces steel (illustration, next page).

As a short cut, the steel industry has been feeding its tall black furnaces a diet of half pig iron and half scrap steel. The scrap, which is already steel, needs only remelting to become usable steel again, as good as new. Thus the economical half-scrap recipe means that the furnace has to consume only enough fuel—and time—to process the pig iron half of its contents into steel.

Tubal Cain Made Sponge Iron for Biblical Customers

To make enough steel to carry the United States through the war, experts estimate that at least 55 million tons of scrap will be needed every year, to be added to an equal amount of pig iron. But now scrap piles in the warring United States are dwindling from mountain height to land level.

How can the furnace produce a full quota of steel on half rations? To make enough pig iron to substitute for the missing millions of tons of scrap would require the slow construction of additional blast furnaces, at a cost of more than a half-billion dollars. So that is where sponge iron comes in.

The low-temperature process that makes sponge iron does not need the expensive blast furnaces, limestone, and large amounts of coke required for pig iron. It turns out a form of iron that is free of the excess carbon in pig iron, and therefore, when pressed into briquettes, can be fed into open-hearth furnaces like scrap.

There are several considerations favoring the use of sponge iron. It can be made in small kilns located on the site of ore deposits, and thus save the time, shipping space, and cost of transporting the ore. Several types of inexpensive kiln can make it, including the small rotary type used for cement. The difference in cost is approximately five dollars per ton in favor of sponge iron.

The sponge iron process is economical of fuel, since the metal is not heated

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La Spezia, Great Naval Port and Base

When long-range British bombers dropped explosives on La Spezia, they struck at one of Italy's greatest concentrations of floating equipment, installations, and supplies for the Italian Navy.

On Italy's northwest coast, about 50 miles southeast of Genoa, La Spezia is approximately 675 air miles from London and 610 miles from the British base at Malta—equally convenient for bombers from either base.

La Spezia serves the Italian Navy's needs with shipbuilding yards, dockyards, an arsenal, machine shops, powerful hydraulic cranes, torpedo and gunnery school ships, as well as large coal sheds and oil tanks for fuel.

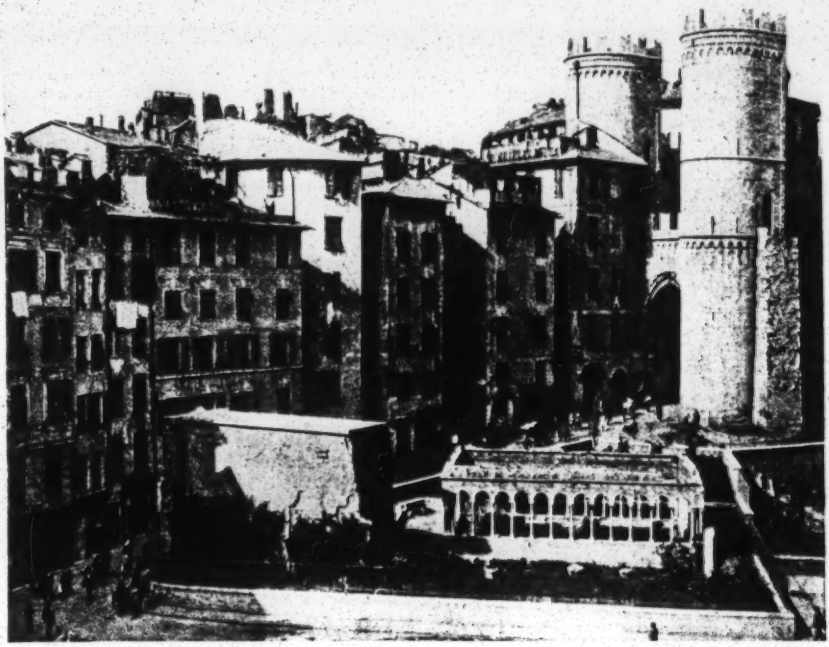
Many inlets and an intricate system of anchorage basins make up La Spezia's harbor, considered one of the largest and safest natural harbors of the Mediterranean. Part is a commercial port although most of the quays are for naval use.

The city stands at the head of the Gulf of Spezia, a broad inlet of the big Gulf of Genoa. The site, bought by the rich merchant city of Genoa in the 13th century, was in use as a port in 1371. Now the city has about 75,000 people.

La Spezia has been introduced to American school children as the resort where the English poet, Percy Bysshe Shelley, was summering in 1822, when his sailboat capsized in a sudden squall and he was drowned.

Note: The port cities of northwestern Italy are shown on the National Geographic Society's Map of Central Europe and the Mediterranean.

Bulletin No. 3, February 8, 1943.



Municipality of Genoa

AGE, NOT BOMBS, WHITTLED THE GENOA HOME OF COLUMBUS DOWN TO A STUB

Since Genoa claims Columbus as a native son, it is possible that he was born in this house at 37 Vico di Morcento where he grew up. For more than 400 years it stood, five stories tall and one room wide, wedged between shabby old buildings which helped support its ancient walls. When the old tenements beside it were cleared away it could not safely stand alone. The three top stories were removed and the second was roofed over. Now squat and square, the house crouches in the shadow of tall tenements near the heart of Genoa's business district.

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Geo-Graphic Brevities

RIDDLE OF SNOWFALL TEASES WEATHER HOBBYISTS

TOO cold to snow?

With winter temperatures freezing many parts of the world, this age-old "true or false" poser bobs up to test the lore of weather-wise amateurs.

It never gets too cold to snow, but it frequently gets too cold for snow to fall in "flakes."

Moisture from the clouds falls in flakes when the air through which it passes is 32 degrees Fahrenheit or slightly lower. At this temperature the air can hold enough moisture to make fat flakes, and the fall is likely to be heavy.

As the temperature sinks, the air becomes drier, the snowfall lighter and more powdery. At sub-zero temperatures the air is too dry for flakes, and a heavy fall of snow is rare. Snow takes the form of ice spicules, ice needles, or fills the air with fine glittering diamondlike dust (illustration, next page).

Snow has fallen in Little America, Antarctica, with the thermometer at 65 below zero. Alaska temperatures well under 50 below have produced snow. In Eastern Siberia, temperatures which average under 40 below have been accompanied by snow. Verkhoyansk, the coldest spot in the world—with a recorded winter temperature of 94 below zero—is within this Siberian section where, in spite of extreme cold, snow can and does fall, although lightly.

* * * * *

OIL-THIRSTY AUSTRALIA REACHES ACROSS OCEANS FOR FUEL

While American motorists are wondering about the scarcity of their rationed gas gallons, they may realize that the U. S. is helping to supply an oil-less ally, Australia. In spite of repeated efforts to find petroleum at home, Australia must still reach around the globe for supplies.

War has multiplied Australia's peacetime need to import annually well over 320 million gallons of gasoline and over 68 million gallons of crude oil. She can no longer dip her empty barrels into the deep pool of Netherlands Indies oil since Japan's invasion. She must go oil-shopping either northeast to the U. S. or northwest to oil-rich Iran and Iraq.

Now that Australia depends on tankers sailing through enemy-infested waters, this almost oil-dry country may resume the long search for oil in her own backyard. More than 40 years ago small amounts of petroleum were found in Queensland when artesian wells were sunk near Roma. Drilling equipment was inadequate—a factor which may have retarded the search elsewhere also—and the well collapsed. In 1929 some 3,000 gallons of gasoline came from a Roma well.

Gas and petroleum, in quantities too small for commercial use, were found at Longreach, Queensland. Small amounts of low-grade oil have been produced in the Lakes Entrance region of Victoria, but without any gushers. Australia's desert and mountain lands have been photographed from the air to locate "domes" and outcroppings, or other surface indications of oil. The Fitzroy River area in Western Australia State and the Carnarvon-Onslow sector farther south in the same State, as well as the fields in Queensland and Victoria, showed greatest promise.

In the huge oil-shale deposits scattered throughout the Commonwealth lies Australia's mainland hope. Oil was first extracted from shale there in 1865. Geologists estimate that shale deposits in New South Wales alone can supply some

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to the molten stage, but is produced in granules from the size of a kernel of corn down to particles as fine as dust, depending on the size of ore chunks.

While other plants are being planned, an experimental furnace at Boulder City, Nevada, has been adapted by the Bureau of Mines to the sponge iron process and has been producing for several months.

This process, successfully employed in Sweden, Finland, and reported to be in use in Japan, was the only iron-making procedure known to mankind until the 14th century. Then Germans in the Rhine valley and other pioneers in Belgium built "tall furnaces" and obtained melting-hot temperatures by using forced blast.

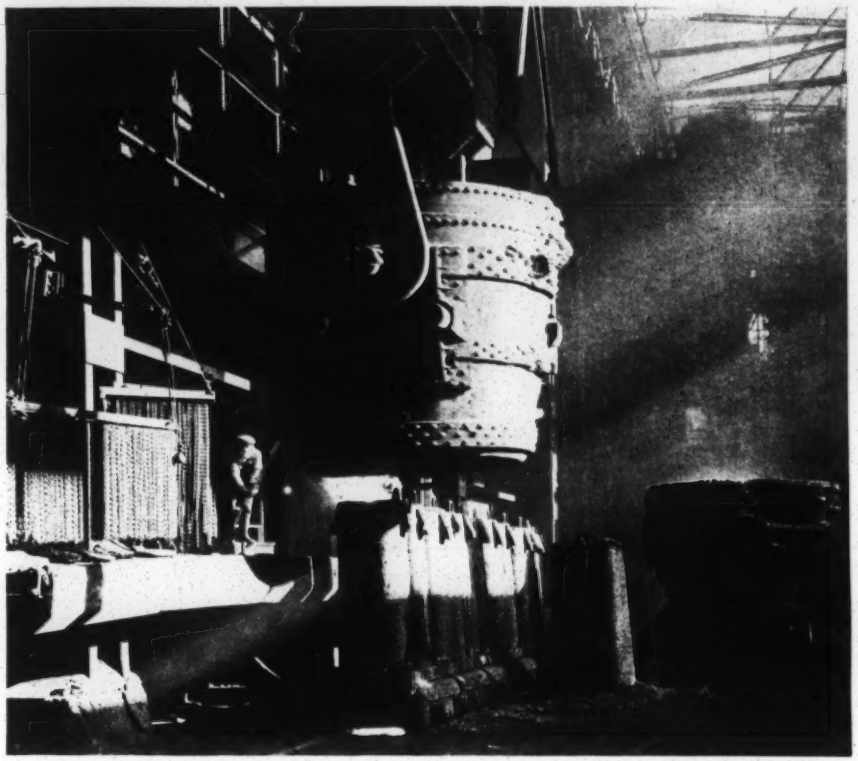
Tubal Cain must have made sponge iron to gain his reputation as the Bible's first smith. History points its finger at the mountains of the Caucasus Isthmus as the original home of iron-processing and possibly the birthplace of sponge iron.

Some of man's first tools and weapons were made of iron, but the earliest iron wasn't mined. It was "heaven sent." It fell from the skies as meteorites.

Note: For information on the use of metals in war, see "Metal Sinews of Strength," in the *National Geographic Magazine*, April, 1942.

See also these GEOGRAPHIC SCHOOL BULLETINS: "World's Largest Steel Industry Supplies U. S.", November 17, 1941; and "Why Is Scrap Metal Necessary?" October 5, 1942.

Bulletin No. 4, February 8, 1943.



Illinois Steel Company

ORE CAN TRAVEL TWO IRON ROUTES TO THIS BIG BUCKET OF MOLTEN STEEL

Whether by the sponge iron or the pig iron route, the ore will wind up "in the soup" in this giant ladle full of molten steel. The bucket-shaped ladle is shown in the process of moving toward the row of ingot molds previously wheeled into place on their track. The fiery liquid metal will cool in the molds into steel ingots, to be shaped into plates for ships or armorplate for tanks, or any of the other manifold uses of steel in this mechanized war. The metal—a mixture of pig iron and scrap steel or possibly of pig iron and sponge iron—has been processed in a 250-ton open-hearth furnace to obtain steel with the proper amount of alloys.

three billion barrels of oil. The plant in the Newnes district, west of Sydney, now in operation, has a capacity for extracting some 10 million gallons a year—about three per cent of Australia's peacetime needs.

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GEOGRAPHIC MAPS LEAD FIGHTERS THROUGH ENEMY WATERS

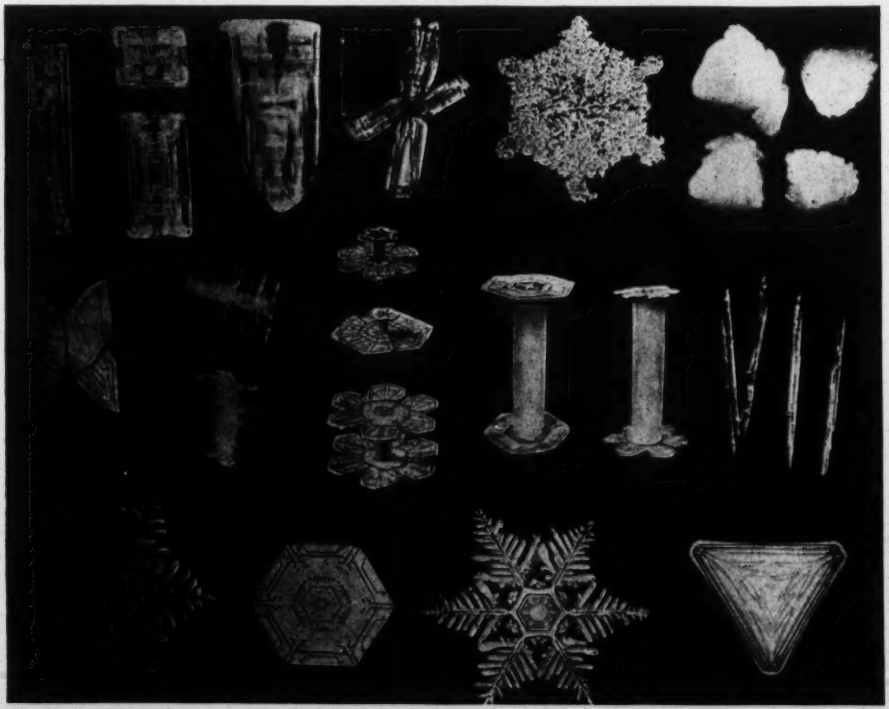
Twice since Pearl Harbor a National Geographic Society map has stood between life and death of United Nations fighters in Pacific battles.

A letter received at the Society's Washington headquarters tells of a perilous voyage made last spring by British Navy men from Java to Fremantle, Australia, more than 2,000 miles by sail.

"It was not until we were at sea that it was discovered the ship possessed no charts of Australian waters," the letter said. "Luckily we found an old number of the *National Geographic Magazine* on board, at the back of which was a map of the world; this we used as our chart to navigate us down to Fremantle."

This recalls the similar escape of Captain William Lloyd Osborne and Captain Damon Gause, American officers. With only a National Geographic Society map and a compass they slipped away from the Jap-invaded Philippines and after 159 days' sail through 1,500 miles of enemy-patrolled sea, landed in Australia.

Bulletin No. 5, February 8, 1943.



Wilson A. Bentley

MEMBERS OF THE SNOWFLAKE FAMILY CHANGE THEIR FACES WITH THE WEATHER

The most numerous of the snowflake clan are those with lacy six-sided patterns, which form when the temperature of the air is around freezing (lower left). An occasional family freak is the triangular member, with only half the usual number of points. Special storm conditions bring out the "cuff-button" types (center). Zero cold brings ice spicules ("little spikes," right end of middle row), the snow grains (end of top row), or six-sided ice column-crystals (upper left). Actual crystals are from one-eighth to one-fortieth of the magnified sizes in the photograph.

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